



# Forest Insect & Disease Management

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## WHITE PINE BLISTER RUST EVALUATION SHENANDOAH NATIONAL PARK



SOUTHEASTERN AREA, STATE & PRIVATE FORESTRY  
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# WHITE PINE BLISTER RUST EVALUATION

## SHENANDOAH NATIONAL PARK

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### ABSTRACT

During June of 1979, an evaluation of white pine blister rust was conducted on the Shenandoah National Park to determine the current incidence of blister rust and the occurrence of Ribes. One thousand trees were examined randomly from all sections of the park. Only 2.3 percent of them were infected and 73 percent of these were suppressed. These data show that no future evaluations are necessary unless park personnel note an increased occurrence of white pine blister rust.

### INTRODUCTION

Eastern white pine, Pinus strobus, is highly valued for its economic and aesthetic importance. The success of white pine as a timber species and as an ornamental can be attributed to an ability to thrive in a variety of forest conditions and to grow rapidly.

White pine blister rust has resulted in widespread damage to white pine throughout much of the eastern United States over the course of the century. The causal agent of white pine blister rust is the pathogenic fungus Cronartium ribicola which requires an alternate host in the genus Ribes to complete its life cycle. The fungal spores from infected Ribes infect the white pine by entering the needles and eventually growing into the bark. Cankers are then formed which can grow into the trunk and cause death. An example of a fruiting blister rust canker on white pine is shown in Figure 1. A fruiting canker caused by the fungus Cenangium ferruginosum can be seen in Figure 2. These two types of cankers may be confused in the field.

For many years Ribes eradication was viewed as the foremost method of controlling white pine blister rust. As the incidence of blister rust decreased over the years, eradication was eventually stopped. Eradication on the Shenandoah National Park ended in 1969.

The present evaluation was conducted in June of 1979 with the objectives of determining the current incidence of blister rust and the occurrence of Ribes around white pine on the park. From the information obtained, conclusions can be drawn regarding the status of blister rust before and after eradication. Recommendations for future control practices can be made after considering evaluation results and the high aesthetic value of white pine on the Shenandoah National Park.

## METHODS

To evaluate white pine blister rust on the park, 1,000 trees were examined. Three hundred trees were taken from the northern section, 300 from the southern section, and 400 from the central section of the park. No more than 100 trees were taken from any stand. To qualify for examination, the trees had to have living branches within 3 feet of the ground and be more than 3 years old.

Each tree was examined to determine the presence of rust infection, symptom class, crown class, age, d.b.h., and Ribes was present within 16 feet of the tree.

A "yes" was recorded for infected white pines and a "no" for those not infected. The tree symptom class refers to the location and age of infections found. Stem and branch cankers were recorded separately. The distance between branch cankers and the main stem was recorded and the age of every canker was recorded. The crown class of each tree was recorded as suppressed, intermediate, or dominant relative to the amount of overstory present. The age of each tree and the d.b.h. of each tree taller than 4.5 feet were recorded. A height was recorded for trees shorter than 4.5 feet. Finally, the number of Ribes found within 16 feet of the tree and the number found within 900 feet of the tree were recorded.



## RESULTS

The results of this evaluation are summarized in Table 1 and Figure 3. The results show a blister rust incidence of 2.3 percent on the park. Infected trees had a smaller average d.b.h. and a lower average age than noninfected trees. Of the infected trees, 86.7 percent were in the suppressed crown class as compared to 73.0 percent of the noninfected trees in that class. Of the Ribes found within 16 feet of the trees, 27.3 percent were infected and 30.77 percent were found within the area.

Figure 3 relates the number of infections to the year the infections occurred. An increase in infections between 1969 and 1979 is indicated. Calculations show that 74.19 percent of all infections found occurred during this last 10 year period.

Infection of white pine by Cenangium ferruginosum was found to be common on many plots but was not considered a threat to any of the stands examined.

## DISCUSSIONS

The increase in the number of infections observed since the end of Ribes eradication is not considered a threat to the park relative to the very low infection incidence of 2.3 percent. The lower number of infections observed between 1959 and 1969 could be the result of the mortality of the more severely affected trees since 1969. Most of the trees infected between 1969 and 1979 are still alive.

The two- to three-year cycle in the number of infections per year becomes apparent in Figure 3. The cycle is probably the result of annual fluctuations in weather conditions favorable for infection.

In view of the slight increase in infection numbers and the overall low infection incidence, it is recommended that the Shenandoah National Park not be evaluated for white pine blister rust again unless an increased occurrence is noted.



Figure 1: White pine blister rust canker.

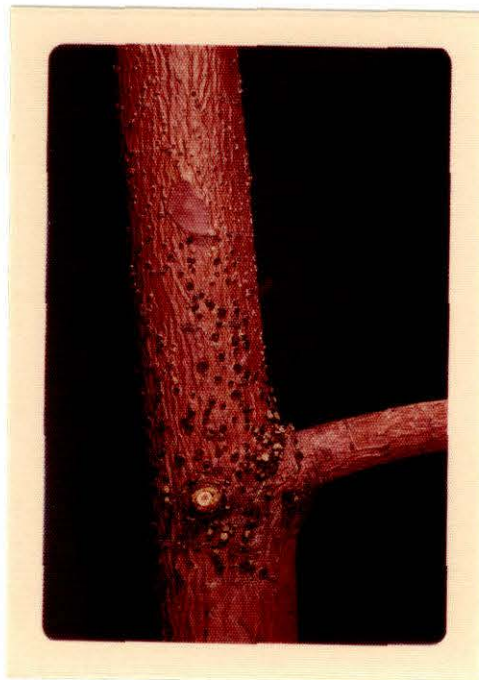


Figure 2: Cenangium ferruginosum canker.

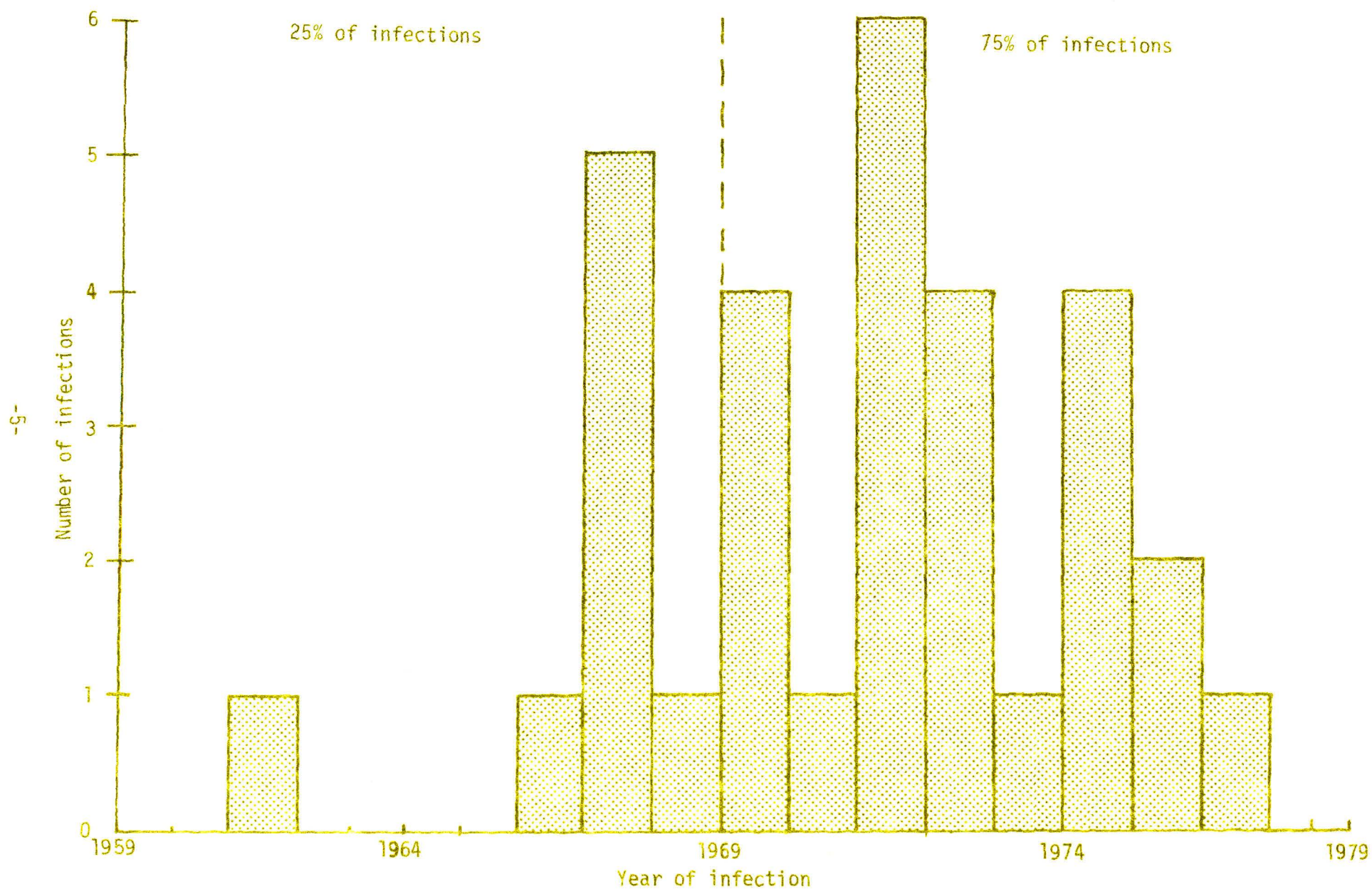


Figure 3: Graph relating number of rust infections found to year infection occurred. Dashed line represents the year Ribes eradication ended (1969).



WHITE PINE							RIBES			
Total		Average	Average	Crown class %			Within 16 ft.		Within area	
No.	%	d.b.h.	age	Dominant	Intermediate	Suppressed	No.	%	No.	%
INFECTED										
25	2.26	3.35	18.6	6.67	6.67	86.67	3	27.27	4	30.77
UNINFECTED										
1083	97.74	4.85	21.5	9.0	18.0	73.0	8	72.73	9	69.23

Table 1. Summary of data for white pine and Ribes on the Shenandoah National Park, 1979.